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Internal migration, mental health, and suicidal behaviors in young rural Chinese

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Abstract

Purpose—There is a dearth of data on the association of internal migration with mental health in young rural Chinese. This study aims to explore the associations between migrant status, mental health, and suicidal behaviors in young rural Chinese.

Methods—We recruited 1,646 rural subjects aged 16–34 years, of whom 756 were migrant workers and 890 non-migrants, from ten representative villages in rural Sichuan Province, the

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southwestern part of China. To assess subject's depressive symptoms and general psychological quality of life (psycho-QOL), the study protocol included the Centre for Epidemiological Studies Depression Scale, and psycho-QOL subscale of the World Health Organization's QOL Questionnaire-Brief Version, in addition to structured questions regarding one-year suicidal thoughts and behaviors (serious ideation, plan, and attempt), socio-demographic, social support, and physical health information.

Results—After adjustment for confounders, migrant workers had relative to non-migrant rural residents a decreased risk for depression (OR = 0.69, *P* = 0.026), but comparable risk for poor psycho-QOL (OR = 0.91, *P* = 0.557) and one-year suicidal behaviors (OR = 0.59–1.10, *P* = 0.19–0.90). Migrant status only accounted for 0.5, 2.8, 4.7, 9.8, and 12.6 % of the total explainable variance for suicide attempt, poor psycho-QOL, suicide plan, depression and serious suicide ideation, respectively.

Conclusion—Our findings suggested that among young rural Chinese there were no significant associations involving migrant status and poor psycho-QOL or one-year suicidal behaviors, while migrant status significantly correlated with a decreased risk of depression. The unique contribution of migrant status to mental health among young rural Chinese participants in this study was very small.

Keywords

Internal migration; Mental health; Suicidal behavior; Chinese; Young

Introduction

China has seen the largest mass internal migration of people from impoverished regions to more urban and prosperous cities since economic reforms began during 1980s, supplying a major workforce in the course of the country's rapid economic growth and urbanization. For some this has involved permanent relocation; however, many are back-and-forth migrants who work in urban settings while sending remittances home. Typically they visit their homes during the Lunar New Year or to help in harvests. According to government statistics [1], rural-to-urban migrant workers (MWs) reached nearly 263 million in 2012, accounting for approximately 20 % of China's population.

In this context, both popular media and published studies have expressed concerns about the burdens on mental health, including suicide, that confront MWs [2–6]. A body of literature suggests that migration is associated with an increased risk for poor mental health [7–11] and suicidal behaviors [12–14] in other parts of the world. Studies in China have revealed mixed, sometimes contradictory findings. Several revealed MWs experienced a variety of health risks that stem from unemployment, bad living conditions, social inequity, discrimination and their mobile status [15–18], and thus, had high prevalence of depression [3], mental health problems [19, 20] and suicidal ideation [21]. Some studies found that MWs had worse mental health based on Symptom Checklist-90-R (SCL-90-R) than the Chinese general population [22, 23] when Chinese SCL-90-R norms were used as reference. However, three studies that included urban and rural comparisons of non-migrant subjects presented mixed results; two reported that MWs had worse mental health than urban non-

migrant subjects [22, 24], two reported poorer mental health in MWs than rural non-migrant subjects [24, 25], and one found comparable mental health status between MWs and urban non-migrants [25]. Another study followed up 109 MWs that compared their SCL-90-R scores pre- and post-migration had reported worsened mental health after migration [26]. Furthermore, considering the geographic heterogeneity in labor exporting regions of MWs, previous studies failed to recruit comparison subjects that matched the geographic, economic, and social origins of MWs in their samples [24, 25], resulting in potentially biased findings due to unknown confounders. To date there has been no study in China that compared the mental health status between MWs and local rural peer counterparts.

In 2005–06, we conducted a mental health survey among young residents of a rural region of southwestern China to explore the prevalence of depressive symptoms, suicidal behaviors and quality of life, with a sample that included both migrant workers and permanent rural dwellers [27]. This epidemiologic sample permits direct comparison of mental health status of well-matched migrant against non-migrant rural Chinese participants, one where residential origin was not a potentially powerful confound. We report in this paper, secondary analyses of the epidemiologic data that compared the mental health and suicidal behaviors of MWs with permanent dwellers in their home villages.

Methods

Subjects and sampling

This study was part of a large-scale cross-sectional survey, which investigated a range of mental health outcomes, suicidal behaviors and migration among young residents in the rural area of Mianyang, Sichuan province, China [27, 28]. Mianyang is the second largest administrative area in Sichuan Province, which is home to a vast rural area where a substantial portion of young people migrates for work in urban China. In the primary study [27], eligible rural subjects were identified by their household registration (*hukou*) in randomly selected study villages, as described below.

We focused on potential participant's ages 16–34 years, given the high rates of suicides among rural Chinese women and men, ages 15–34 years (38 and 23 per 100,000, respectively) [29]. As 70 % of MWs are within the 16–35 age range [30], we regarded our sample as potentially useful for understanding the burdens they face. The minimum age for participation was 16 years given China's regulations regarding the earliest age that a person can provide informed consent.

We adopted a multistage random cluster sampling method to obtain a representative sample of rural residents. The details of the sampling and recruitment process have been described elsewhere [27, 28]. Briefly, we randomly selected 24 towns from 277 candidate towns of rural area of Mianyang in the first stage of sampling. Of the 266 candidate villages in these 24 towns, 11 were randomly selected as the primary sampling units (PSUs) in stage 2 of the sampling. One PSU was randomly chosen as a training site for our interviewers and for pilot testing of the questionnaire. From the remaining 10 PSUs, 3,008 potential subjects 16–34 years were identified using the comprehensive list of residents registered in the *hukou* system in the final stage of sampling. To maximize the recruitment of participants,

particularly migrant workers who returned home during the fall harvest time and the Chinese New Year, the survey was carried out in two waves: August–September 2005 and January–February 2006 (coincident with the Chinese New Year holiday).

Procedures

The Survey and Behavioral Ethics Committee of the Chinese University of Hong Kong approved the study protocol. A written informed consent was obtained from all subjects, and declaration of confidentiality was made before the interview.

Twenty-four interviewers, all of whom were fluent in local dialects, who were recruited from the Mianyang City Center for Disease Control and Prevention, participated in a 7-day training course that included instrument introduction, fieldwork procedure, standardized interview skills, mock interview, inter-rater reliability test, a paper examination, and the pilot survey in the aforementioned village. These interviewers passed the examination and their agreement on the rating instruments reached satisfactory to good level (all ICC coefficients >0.75).

All information was collected through face-to-face interviews conducted in places providing reasonable privacy (village doctors' office, home, etc.) that were deemed convenient for respondents. The completeness of all interview records was checked daily. Quality control meetings were conducted every fifth working day by the survey team leader.

Instruments and measures

The questionnaire was developed specifically for this survey. It contained basic socio-demographic variables (age, gender, marital status, education, occupation, financial perception) and questions about physical illness, history of psychiatric illness, and social support.

For the classification of occupation and migrant status, we used the following algorithm: first, each participant was asked, "What is your current occupational status?", and was asked to choose one of the following categories: "A = student", "B = out-migration work", "C = farming", "D = household work", and "E = have nothing to do but just stay at home". The migrant group included all subjects whose occupation was "B". The non-migrant group consisted of respondents who were engaged in "A", "C", "D" and "E". This question was developed based on the results of our pilot study in Mianyang and its five options covered all types of occupation of young rural Chinese in our study site. Subjects who were mainly engaged in farming, but still did some short-term paid jobs in counties or small cities nearby their villages during the off-season, were classified as farmers because they were quite different from MWs who can only visit their home-towns once or twice a year. In our study, there also were several subjects who stayed with their urban relatives but did not seek or perform any paid jobs. These "out-no-work" subjects were also coded under the category of "have nothing to do but just stay at home".

Social support was measured using a previously developed Chinese Social Support Rating Scale (SSRS) by Xiao et al. [31]. This 10-item instrument evaluates three dimensions of social support, including (1) objective social support, referring to actual received practical

support and available social networks; (2) subjective social support, referring to emotional and perceived support; and (3) utilization of social support, referring to one's use of social network. A 4-point scale (from “never” to “a lot”) is used to measure responses for all items except 5, 6 and 7. It has been shown to be reliable and valid for measuring the social support of Chinese population [32].

The assessment of mental health status included the following:

(1) Chinese version of the Centre for Epidemiological Studies Depression Scale (CES-D): The CES-D is a 20-item self-report questionnaire to assess depressive symptoms using a four-point rating scale. Total score can vary between 0 and 60, with higher scores demonstrating more symptoms of depression. A cut point of 16 or greater (≥16) is defined as depression in Chinese population [33, 34]. The Chinese version of CES-D has been proven to be reliable and valid for Chinese people [35].

(2) The 6-item Psychological Quality of Life (psycho-QOL) subscale from the Chinese edition of the World Health Organization's QOL Questionnaire-Brief Version (WHOQOL-BREF): The WHOQOL-BREF has been validated in Chinese population [36, 37]. Its six questions ask about mental QOL in the past month on a 5-point Likert scale ranging from 1 (“not at all”) to 5 (“extremely”). The scores from all the six items were added up to sum score ranging from 6 to 30, where higher scores indicated better mental health. The WHOQOL-BREF psycho-QOL subscale is recognized as a useful tool for investigating population mental health in large epidemiological surveys, evaluating treatment effectiveness in clinical trials and monitoring outcomes in clinical practice [38]. Despite there is no recommended cutoff value for WHOQOL-BREF to discriminate between good and poor psycho-QOL, our study has the advantage of a large sample of rural residents, that is to say, we can use its score distribution to set a cutoff value (minimal standard), below which will be classified as poor psycho-QOL. One commonly used cutoff standard for poor psycho-QOL has been proposed, namely, “one SD below the mean” [39, 40]. Thus, according to this standard, a subject with a score less than one SD below the mean will be considered as having poor psycho-QOL. Based on our result, the cutoff score was <19.5 for psycho-QOL of WHOQOL-BREF.

(3) Suicidal thoughts and behaviors: Three questions about the one-year serious suicide ideation, suicide plan and attempted suicide taken from National Comorbidity Survey [41]: “Have you ever seriously thought about committing suicide?”, “Have you ever made a plan for committing suicide, or even taken steps to prepare for this plan?”, and “Have you ever attempted suicide?” For each item endorsed, the interviewer would ask, “When was the last time?” If a response was affirmative for any time during the prior 12 months, it was recorded as “past year”. The reason that “one year” was used instead of “lifetime” is because “one-year” timeframe is more clinically relevant and less prone to recall bias.

Statistical analysis

For analyzing the data, the SPSS software for Windows, version 17.0 (SPSS Ltd.) was employed. Continuous variables (age and three subscales of SSRS) were dichotomized by a median split approach prior to the analysis. Using univariate analysis, we described in migrant and non-migrant groups the prevalence rates of poor mental health indicators and the frequency distribution of explanatory factors. The prevalence of poor mental health indicators was additionally shown in categories of the potential confounding variables. Comparisons between different groups were made using Chi square test or Fisher's exact test. Through these descriptive analyses, we could observe the differences between migrant and non-migrant groups, and identify explanatory variables that contribute to the outcomes. The associations between migrant status and poor mental health indicators were investigated by adjusting for confounders in multiple Logistic regression models. We quantify associations of migrant status and poor mental health indicators by calculating Odds Ratios (ORs) with 95 % Confidence Intervals (CIs).

To study the unique contributions of some groups of variables in the explanation of outcomes, a hierarchical multiple regression analysis was performed. Variables that explain each outcome were entered in five steps. In step 1, migrant status was the only independent variable. In step 2, age group and gender were entered into step 1 model. The subsequent 3rd–5th steps included all socio-demographic variables, clinical factors, and social support on the basis of its previous step. Nagelkerke *R* Square (R^2) and "change in $R^{2''}$ (ΔR^2) were calculated as the indicators for goodness-of-fit of model and the contributions of a set of variables in each step, respectively. Hosmer–Lemeshow's goodness-offit test (H–L test) was performed to test the robustness of each model [42]. Obtaining a significant result on H–L test would indicate that the model is not well calibrated, so the fit is not good. Two-sided $P \leq 0.05$ was regarded as statistically significant.

Results

Characteristics of participants

Of the 3,008 names generated from the *hukou* list, 1,284 were either living away permanently or were migrant workers who had not returned home for prolonged periods and, thus, were not approached in the sampling. A total of 1,689 people were approached, and 1,646 completed the survey; hence, the response rate was 97.5 %. The mean age was 26.7 years [standard deviation (SD) = 6.1], and 47.2 % were male. The mean scores (SDs) for objective support, subjective support and utilization of support sub-scales in SSRS were 10.2 (2.6), 24.6 (4.1), and 7.5 (1.8), respectively. According to the definition of migrant status, this sample included 756 migrant workers and 890 non-migrant rural residents. Basic socio-demographic features, clinical characteristics, and SSRS scores of both groups are displayed in Table 1.

Prevalence rates of poor mental health indicators and comparability of migrant and non-migrant groups

As shown in Table 1, compared to non-migrant residents, migrant workers reported a lower prevalence of depression, poor psycho-QOL, and one-year serious suicide ideation ($P \leq$

0.042). Both residents and MWs had comparably low levels for one-year suicidal plans and attempts ($P \geq 0.24$). Univariate analysis also showed significant differences between both groups with respect to gender, age, education, financial perception, medical conditions, and objective support of SSRS ($P \leq 0.046$). Individuals in the migrant group were more likely to be male, be young, have a middle school (and above) education, not have bad financial perception, not be suffering from medical conditions, and have low objective support.

Confounders of the associations between migrant status and poor mental health indicators

Table 2 shows the explanatory variables contributing to higher risk of depression, poor psycho-QOL and suicidal behaviors. Significant factors associated with depression and poor psycho-QOL based on univariate analysis included: female gender, divorced/widowed/separated marital status, perceived inadequate financial status, history of psychiatric disease, suffering from medical conditions, lower objective social support, lower subjective social support and lower utilization of social support. Education of primary school and below was significantly correlated with depression. Suffering from medical conditions and lower utilization of social support were significantly associated with higher prevalence of one-year serious suicide ideation and plan. In addition, suffering from medical conditions was also a significant risk factor for one-year suicide attempt.

Because migrant and non-migrant groups were unmatched in terms of several socio-demographic variables, clinical factors and social support, and these factors had impact on mental health outcomes, we considered these variables as confounders—i.e., potential powerful independent variables that were not the focus of this study regarding the effects of the participants' migration status.

Adjusted associations between migrant status and poor mental health indicators, and the unique contribution of migrant status to poor mental health indicators

The adjusted ORs and indicators for goodness-of-fit of the five models in the hierarchical multiple regression analyses are shown in Table 3. P values from H–L tests indicated that all the models fitted our data well ($P = 0.335–0.919$). Prior to the adjustment of confounders, model 1 shows that migrant workers had lower risk for depression, poor psycho-QOL, and one-year serious suicide ideation compared with non-migrant people (OR = 0.43–0.76, $P \leq 0.043$), but had similar risk for one-year suicide plan and attempt (OR = 0.62 and 0.78, $P = 0.248$ and 0.707). In model 5, after controlling all potential confounders, the decreased risk for poor psycho-QOL and serious suicide ideation of migrant status disappeared (OR = 0.91 and 0.59, $P = 0.557$ and 0.190, respectively), but the protective effect of migrant status to depression remained (OR = 0.69, $P = 0.026$), migrant group still do not have an increased risk for suicidal plan and attempt (OR = 0.89 and 1.10, $P = 0.788$ and 0.901, respectively).

Table 3 also presents the unique contributions of various groups of explanatory variables, as measured by ΔR^2/total R^2. Socio-demographic variables can explain 53.0 and 46.5 % of the total explainable variance in depression, poor psycho-QOL, whereas clinical variables can explain 39.1 and 50.2 % of the total explainable variance in suicide plan and attempt, social support can explain 33.6 % of the total explainable variance in suicide ideation. On the

contrary, migrant status can only account for a little part of the total explainable variance for poor psycho-QOL, suicide plan and suicide attempt (the percentages ranged from 0.5 to 4.7 %), whereas migrant status explained a small part of the total explainable variance in depression and suicide ideation (9.8 and 12.6 %).

Discussion

The impact of human migration on mental health is complex and has cross-cultural differences [11]. Currently, there are limited data available regarding the association between internal migration and mental health among MWs. This study examined and compared the psychological consequences of urbanization in both migrants and permanent rural residents from the same communities, and revealed several interesting findings. Our analysis showed that, compared to their rural residing peers, migrant workers had a decreased risk for depression and comparable risk for poor psycho-QOL and one-year serious suicide ideation. There were no differences in one-year suicidal plans and attempts; indeed, both were low in MWs and residents.

When parsed from other variables, migrant status showed a significant protective effect for depression. This may be consistent with the so-called “healthy migrant effect,” as we will consider shortly. Meanwhile, the unique role relative to several mental health indicators was very weak and its unique contribution to depression and suicide ideation was relatively small—indicating that it did not serve as a significant factor for the overall group in the genesis of these conditions. Socio-demographic features, clinical characteristics, and social support accounted for substantial explainable variance in all mental health indicators. These findings suggest, as one might anticipate, that the mental health of contemporary rural residents, and their migrant worker kin, is a multifactorial and complex process. Despite indications in the literature, migration itself may not be a centrally determining factor for the mental health of rural young people in this part of China—including both the workers who travel back-and-forth and those who are “left behind.”

Two previous studies [24, 25], which recruited rural controls from the home provinces of origin for the majority of the migrant sample, had compared the mental health between MWs and non-migrant rural residents. After controlling for confounders, they gave opposite findings: Li et al. [24] found that the MW group had more severe depressive symptoms than rural controls, but the group difference in SCL-90-R Global Mental Health indicator was not significant. Li et al. [25] found that MWs’ mental health was significantly worse than rural dwellers. Our findings are only partly consistent with these Chinese studies but very similar to a Swedish immigrant study [43] and a Peru rural-to-urban migrant survey; [9] both found significant differences in common mental illness between migrants and native controls disappeared after the adjustment for their unmatched socio-economic factors, and Tonghog et al. [43] concluded that the association between immigrant status and mental illness appeared to be a primary effect of a higher prevalence of social and economic disadvantage among immigrants in Sweden.

The discrepancies between the present study and two Chinese studies [24, 25] might be ascribed to the geographic heterogeneity of their control subjects, which made their findings

relatively unstable compared with our geographically homogenous controls. Our univariate analysis showed that migrant and non-migrant group differed significantly in terms of several socio-economic variables; individuals in the migrant group were more likely to be male, be young, have higher levels of education, have a greater sense of financial security, and not have disabling medical conditions.

These data point to what some have called the “healthy migrant effect;” [44] i.e., that those persons who make a choice to become migrants are healthier, more prepared and resilient, and more suited to deal with the challenges they will face inevitably. This theoretical inference seems plausible to interpret our findings, as the associations between migrant status and depression were weak, and disappeared in the context of assessing psycho-QOL and suicide ideation after introducing socio-demographic, clinical and social support variables into the statistical models. Socio-demographic and clinical variables and social support accounted for most of the explainable variance in mental health indicators but not migrant status. Moreover, the considerable economic benefits derived by migrant workers, despite frequent hardships, may contribute to the findings of our cross-sectional study [45].

A meta-analysis by Swinnen et al. [46] found no evidence for increased risk of mood disorders associated with migration. Our findings that, migrant status had no association with poor psycho-QOL and a significant association with lowered risk of depression were in line with a Peru migrant survey [9] but discordant with Swinnen's meta-analysis. This discordance may be due to the difference between psycho-QOL and depressive symptoms, with the former being a more comprehensive mental health indicator.

Migration in China and elsewhere relates to seeking new, distant settings to enhance personal and family financial and social security, while overcoming multiple (often) difficult obstacles [45]. Coutinho et al. [47] in Brazil concluded that migration to a new environment with better economic opportunities impacts positively on psychological well-being. China's migrant workers are unique in many respects, particularly in scale and remaining connections to home communities; unlike migrations of the past century, they are connected with mobile phones and the internet, travel home frequently, and serve as a direct source of support for their distant families. Indeed, we should be mindful that while some rural residents are thought to be “left behind,” particularly elders and young children, many have benefited materially from the efforts of their migrating kin.

Suicide studies of international migrant populations have conflicting findings, and are confounded by the tendencies of migrating populations to bring with them the health habits of their origin countries. Some have shown an association between migration and suicide [12–14], but others have demonstrated lower rates [48, 49]. China, with its model of internal migration from distant provinces to coastal and urban industrial centers, poses new questions that cannot yet be answered through a well-developed or replicated literature. One Chinese study by Li et al. [25] demonstrated that the prevalence rates of lifetime suicidal ideation and attempt in MWs were comparable to those in urban and rural dwellers. In our sample, we found no associations between suicidal behaviors and internal migration. Migrant status in our sample contributed minimally to suicidal behaviors, but the suicides at Foxconn [6] raised public concern regarding welfare of MWs. However, neither the personal profiles

identified after careful case reviews [50] nor the overall prevalence of suicide reported among the Foxconn workforce suggested migration-related differences to age peers from other parts of China. (Indeed, the Foxconn cases were more notable for the impact of media communications on timing and the method of death—jumping—more than any apparent migration-related effect [6])

The present study has several limitations. As the MW sample was selected from the rural region of one province, the characteristics of participants from Sichuan may be sufficiently different from those drawn from other MW studies, in light of the greatly diverse socio-cultural features that are apparent across China. We must, therefore, be cautious when considering implications for migrants from other regions. Our sample only represented a relatively narrow age strata of 16–34 years, which is different from other studies using broader age ranges. We depended on study participants to tell us whether they worked locally or at distant locations that required living away from home for extended periods of time. We did not set a minimum number of months or years of distance residence before defining someone as a “migrant” worker. In this study, some farmers with brief work experience in cities were classified as non-migrants as their main occupation was farming. It is possible that these non-migrants may have better mental health because of the economic benefits due to the brief out-migration work, or perhaps, healthy persons following this demanding path of, in essence, carrying two jobs. Hence, our findings that MWs had low prevalence of depression and comparable prevalence of poor psycho-QOL and suicidal behaviors compared with non-migrants should be relatively conservative. Because our subjects were young rural laborers, the majority of them was actively working in agricultural and non-agricultural industries, the proportion of subjects living in cities with their relatives but had no paid jobs, i.e., “out-no-work” occupational status, was very low. Thus, the impact of “out-no-work” status on our overall results should be very limited. Furthermore, there were a substantial number of “unapproachable” residents in the present study, most living outside our study villages because of migrant work at distant sites or who lacked resources to return home even during Chinese New Year. Their mental health characteristics may have been different. Finally, the small numbers of participants detected with suicide plans and behaviors lessen the power of our statistical analyses; our findings regarding suicide plans and attempts need verification in very large samples.

Conclusions

The findings in the present study suggested that there were no significant associations between migrant status and poor psycho-QOL and one-year suicidal behaviors in young rural Chinese aged 16–34 years. Indeed, migrant status significantly correlated with a decreased risk of depression. Socio-demographic and clinical variables, and social support, not migrant status, were the central determinants of mental health among all participants.

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Abbreviations

MW	Migrant worker
SCL-90-R	Symptom Checklist-90-R
CES-D	Centre for Epidemiological Studies Depression Scale
WHOQOL-BREF	World Health Organization's Quality of Life Questionnaire-Brief Version

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Table 1

Distribution of poor mental health indicators and explanatory variables of migrant and non-migrant groups [expressed as frequency (%)]

Variables	Migrant group (*N* = 756)	Non-migrant group (*N* = 890)	χ^2	*P*
Outcome variables				
Depression (CES-D ≥16)	82 (10.8)	156 (17.5)	14.3	<0.001
Poor psycho-QOL(psycho-QOL of WHOQOL-BREF <19.5)	105 (13.9)	156 (17.5)	4.13	0.042
One-year serious suicide ideation	10 (1.3)	27 (3.0)	5.45	0.020
One-year suicide plan	9 (1.2)	17 (1.9)	1.36	0.240
One-year suicide attempt	4 (0.5)	6 (0.7)	0.14	0.706
Explanatory variables				
Male gender	440 (58.2)	337 (37.9)	67.8	<0.001
16-29 year age group	448 (59.3)	457 (51.3)	10.3	0.001
Marital status				
Married/re-married/co-habiting	448 (59.3)	546 (61.3)	0.942	0.636
Never-married	246 (32.5)	279 (31.3)		
Divorced/widowed/separated	62 (8.2)	65 (7.3)		
Education of middle school and above	547 (72.4)	451 (50.7)	80.5	0.001
Financial perception				
Good	112 (14.8)	128 (14.4)	10.0	0.040
Moderate	549 (72.6)	605 (68.0)		
Bad	95 (12.6)	157 (17.6)		
History of psychiatric disease	7 (0.9)	14 (0.016)	1.35	0.245
Suffering from medical condition	136 (18.0)	194 (25.7)	4.49	0.041
SSRS objective support score >10	339 (44.8)	443 (49.8)	3.99	0.046
SSRS subjective score > 25	332 (43.9)	376 (42.2)	0.38	0.539
SSRS utilization of support score >7	351 (46.4)	407 (45.7)	0.08	0.777

psycho-QOL psychological quality of life, *WHOQOL-BREF* the World Health Organization's Quality of Life Questionnaire-Brief Version, *SSRS* social support scale

Table 2

Prevalence rates of depression, poor psycho-QOL and one-year suicidal behaviors by variables

Variables	No. of subjects	No. (rate, %) of depressions	No. (rate, %) of poor psycho-QOLs	No. (rate, %) of serious suicide ideations	No. (rate, %) of suicide plans	No. (rate, %) of suicide attempts
Gender						
Male	777	97 (12.5)	91 (11.7)	12 (1.5)	8 (1.0)	4 (0.5)
Female	869	141 (16.2)*	170 (19.6)***	25 (2.9)	18 (2.1)	6 (0.7)
Age group						
≤29 years	905	129 (14.3)	149 (16.5)	20 (2.2)	14 (1.5)	5 (0.6)
>29 years	741	109 (14.7)	112 (15.1)	17 (2.3)	12 (1.6)	5 (0.7)
Marital status						
Married/re-married/co-habiting	994	114 (14.5)	130 (13.1)	19 (1.9)	14 (1.4)	7 (0.7)
Never-married	525	93 (17.7)	104 (19.8)	15 (2.9)	9 (1.7)	2 (0.4)
Divorced/widowed/separated	127	31 (24.4)***	27 (21.3)**	3 (2.4)	3 (2.4)	1 (0.8)
Education						
Middle school and above	998	130 (13.0)	154 (15.4)	19 (1.9)	15 (1.5)	5 (0.5)
Primary school and below	648	108 (16.7)*	107 (16.5)	18 (2.8)	11 (1.7)	5 (0.8)
Financial perception						
Good	240	23 (9.6)	22 (9.2)	5 (2.1)	3 (1.3)	1 (0.4)
Moderate	1,154	137 (11.9)	165 (14.3)	20 (1.7)	13 (1.1)	4 (0.3)
Bad	252	78 (31.0)***	74 (29.4)***	12 (4.8)	10 (4.0)	5 (2.0)
History of psychiatric disease						
No	1,625	225 (13.8)	254 (15.6)	36 (2.2)	25 (1.5)	9 (0.6)
Yes	21	13 (61.9)***	7 (33.3)*	1 (4.8)	1 (4.8)	1 (4.8)
Suffering from medical condition						
No	1,316	154 (11.7)	191 (14.5)	20 (1.5)	13 (1.0)	4 (0.3)
Yes	330	84 (25.5)***	70 (21.2)**	17 (5.2)***	13 (3.9)***	6 (1.8)**
SSRS objective support						
>10	782	83 (10.6)	86 (11.0)	13 (1.7)	10 (1.3)	2 (0.3)
≤10	864	155 (17.9)***	175 (20.3)***	24 (2.8)	16 (1.9)	8 (0.9)
SSRS subjective support						
>25	708	71 (10.0)	70 (9.9)	11 (1.6)	10 (1.4)	4 (0.6)
≤25	938	167 (17.8)***	191 (20.4)***	26 (2.8)	16 (1.7)	6 (0.6)
SSRS utilization of support						
>7	758	84 (11.1)	79 (10.4)	5 (0.7)	5 (0.7)	3 (0.4)
≤7	888	154 (17.3)**	182 (20.5)***	32 (3.6)***	21 (2.4)**	7 (0.8)

psycho-QOL psychological quality of life, *SSRS* social support scale

Chi square test or Fisher's exact test

* $P < 0.05$

** $P < 0.01$

*** $P < 0.001$

Table 3

Adjusted Odds Ratios (95 % Confidence Intervals) for associations between migrant status and depression, poor psycho-QOL and suicide behaviors with the non-migrant group as reference category, and contributions of various types of explanatory variables

Mental health indicators	Model 1 (unadjusted for any other variables)	Model 2 (adjusted for age group and gender)	Model 3 (adjusted for all socio-demographic variables)	Model 4 (adjusted for socio-demographic and clinical variables)	Model 5 (adjusted for socio-demographic and clinical variables and social support)
Depression					
OR (95 % CI)	0.5 (0.43, 0.77)	0.60 (0.44, 0.80)	0.68 (0.50, 0.93)	0.70 (0.51, 0.96)	0.69 (0.50, 0.96)
P	<0.001	0.001	0.015	0.029	0.026
R^2	0.016	0.018	0.105	0.143	0.164
ΔR^2	0.016	0.002	0.087	0.038	0.021
$\Delta R^2/R^2$ in model 5, %	9.8	1.2	53.0	23.2	12.8
Hosmer-Lemeshow Test					
χ^2	–	5.937	4.952	4.294	10.034
P	–	0.430	0.763	0.830	0.263
Poor psyho-QOL					
OR (95 % CI)	0.76 (0.58, 0.99)	0.84 (0.63, 1.10)	0.94 (0.70, 1.26)	0.95 (0.71, 1.27)	0.91 (0.68, 1.24)
P	0.043	0.205	0.686	0.716	0.557
R^2	0.004	0.023	0.090	0.098	0.144
ΔR^2	0.004	0.019	0.067	0.008	0.046
$\Delta R^2/R^2$ in model 5, %	2.8	13.2	46.5	5.6	31.9
Hosmer-Lemeshow Test					
χ^2	–	2.288	5.609	3.224	7.342
P	–	0.891	0.691	0.919	0.500
One-year serious suicide ideation					
OR(95 % CI)	0.43 (0.21, 0.89)	0.47 (0.22, 0.99)	0.56 (0.26, 1.19)	0.63 (0.29, 1.36)	0.59 (0.27, 1.30)
P	0.023	0.048	0.131	0.239	0.190
R^2	0.018	0.024	0.058	0.095	0.143
ΔR^2	0.018	0.006	0.034	0.037	0.048
$\Delta R^2/R^2$ in model 5, %	12.6	4.2	23.8	25.9	33.6
Hosmer-Lemeshow Test					
χ^2	–	1.004	9.086	6.599	12.150
P	–	0.985	0.335	0.580	0.145
One-year suicide plan					
OR (95 % CI)	0.62 (0.27, 1.40)	0.70 (0.31, 1.61)	0.78 (0.33, 1.83)	0.91 (0.38, 2.20)	0.89 (0.37, 2.15)
P	0.248	0.403	0.563	0.833	0.788
R^2	0.006	0.015	0.056	0.106	0.128
ΔR^2	0.006	0.009	0.041	0.05	0.022
$\Delta R^2/R^2$ in model 5, %	4.7	7.0	32.0	39.1	17.2

Mental health indicators	Model 1 (unadjusted for any other variables)	Model 2 (adjusted for age group and gender)	Model 3 (adjusted for all socio-demographic variables)	Model 4 (adjusted for socio-demographic and clinical variables)	Model 5 (adjusted for socio-demographic and clinical variables and social support)
Hosmer-Lemeshow Test					
χ^2	–	5.115	3.062	4.049	4.271
P	–	0.529	0.879	0.853	0.832
One-year suicide attempt					
OR(95 % CI)	0.78 (0.22, 2.79)	0.84 (0.23, 3.08)	0.95 (0.24, 3.70)	1.23 (0.29, 5.11)	1.10 (0.26, 4.65)
P	0.707	0.790	0.941	0.781	0.901
R^2	0.001	0.003	0.067	0.172	0.209
ΔR^2	0.001	0.002	0.064	0.105	0.037
$\Delta R^2/R^2$ in model 5, %	0.5	1.0	30.6	50.2	17.7
Hosmer-Lemeshow Test					
χ^2	–	2.797	7.897	4.631	7.436
P	–	0.834	0.342	0.796	0.490

Although several explanatory variables were not significant in univariate analysis, there is evidence that they have potential contributions to the mental health outcomes, thus, these non-significant variables were also included into Logistic regression models